

Fabrication Process and Electronics Development for Scaling Segmented MEMS DMs, Phase I

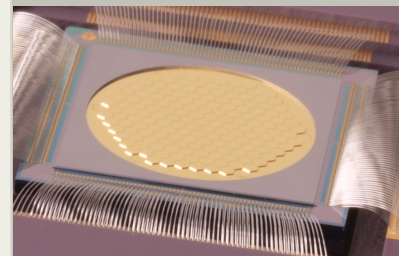
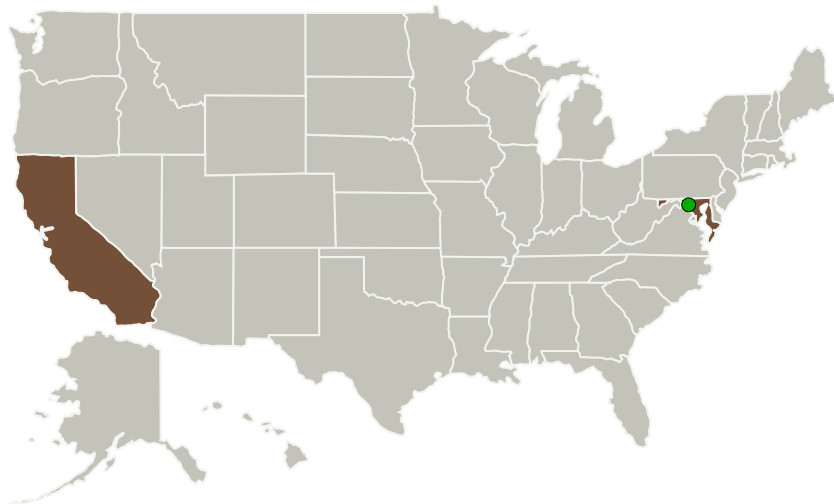
Completed Technology Project (2013 - 2013)



Project Introduction

Microelectromechanical systems (MEMS) technology has the potential to create deformable mirrors (DM) with more than 10^4 actuators that have size, weight, and power specifications that are far lower than conventional piezoelectric and electrostrictive DMs. However, considerable development is necessary to take state-of-the-art DMs today and make them flight-like. This Phase I SBIR proposal addresses two critical areas in MEMS DM development towards the goal of developing flight-like hardware. Namely, Phase I research will further develop Iris AO's proven hybrid MEMS DM technology to: 1) make a critical assembly step in the fabrication process scalable to wafer scales and 2) increase drive electronics resolution to 16 bits while simultaneously reducing power requirements more than three-fold over existing 14-bit resolution electronics. The increased spatial and actuator resolution afforded by the development here will enable picometer resolution DMs required to reach 10^{10} contrast levels necessary for direct detection of Earth-sized terrestrial planets.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Iris AO, Inc.	Lead Organization	Industry	Berkeley, California
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
California	Maryland

Project Transitions

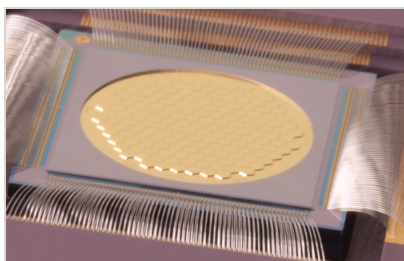
▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140444>)

Images



Project Image

Fabrication Process and Electronics Development for Scaling Segmented MEMS DMs
(<https://techport.nasa.gov/image/129325>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Iris AO, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Michael A Helmbrecht

Co-Investigator:

Michael Helmbrecht

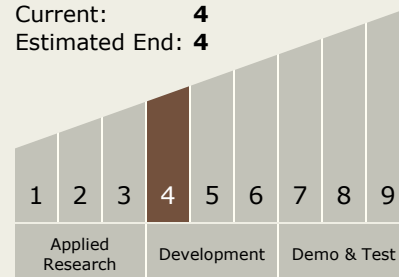
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Technology Maturity (TRL)

Start: 4
Current: 4
Estimated End: 4



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System